**Aston University / EPSRC DTP PhD studentships**

**Scholarship details:** Studentship covers full UK PhD tuition fees and a tax-free maintenance allowance

**Duration:** 3 years

**Closing Date for applications:** 31st January 2022

The College of Engineering and Physical Sciences at Aston University has funding available for a number of fully funded PhD studentships for the Academic Year 2022-23.

Descriptions of three PhD studentships can be found below. You can contact the lead supervisor for advice or information about any project that particularly interests you.

Details of how to submit your application, and the necessary supporting documents can be found here . Please follow the instructions under 'How to Apply' to submit an application by the deadline of 31 January 2022.

We aim to attract high calibre PhD candidates who will make a significant contribution to research and knowledge in the relevant discipline. Aston University is proud of its vibrant, friendly and supportive working environment and family atmosphere.

**Funding**

Engineering and Physical Sciences College DTP PhD studentships are fully funded for 3 years. They include a maintenance allowance based on UKRI minimum and Home tuition fees (subject to eligibility). For reference, in the 2021/22 academic year, the maintenance allowance was £15,609 and the Home tuition fees were £4,500.

Limited funding is available for international candidates. Overseas applicants may apply for this studentship but will need to cover the difference between the 'Home' and the 'Overseas' tuition fees. (For reference, in the 2021/22 academic year, this difference was £13,100). As part of the application, you will be required to confirm that you have applied for, or secured, this additional funding.

Full details of eligibility can be found here. Further guidance on UKRI Eligibility Criteria can be found on the UKRI website.

See these links for further details of three available topics:

2022-2023_054 - Vulnerable Transport Modes – Modelling the Behaviour and Health Impacts of Pedestrians, Cyclists and Micromobility Users.

2022-2023_042 - Minimum Infrastructure Internet of Things (IoT) Sensor Networks for Air Quality Monitoring

2022-2023_032 - The Future of Forests In Sub-Saharan Africa

## 2022-2023_054 - Vulnerable Transport Modes – Modelling the Behaviour and Health Impacts of Pedestrians, Cyclists and Micromobility Users.

**Supervisor:** Dr Lucy Bastin (School of Digital Engineering; Computer Science Department)
**Assoc. Supervisor:** Dr Maria Chli (School of Digital Engineering; Computer Science Department)
**Assoc. Supervisor:** Dr George Vogiatzis (School of Digital Engineering; Computer Science Department)

**Area of Research:** Multi-agent systems, Computer Vision, Machine Learning, GIS, Air Quality

**Project Summary, Aim and Objectives:** Currently, data on vulnerable road user groups (pedestrians, cyclists, etc.) is infrequently collected, poorly described, and rarely analysed. A growing proportion of road users around the globe are travelling by active modes or using micromobility solutions like eScooters, particularly in cities. It is increasingly important to measure, monitor and model the use of these vulnerable modes and evaluate their implications for safety, network priority, air quality and sustainability.

In this project you will work with market-leading road safety analysts and a team of experienced academic researchers to build a detailed model of vulnerable road user behaviour. You willuse CCTV footage to calibrate and validate models of these users' real world behaviour and build innovative models to predict the impacts of mobility choices on the individual and on the urban system as a whole. You will use air quality data from a range of existing sources (satellites, DEFRA monitoring stations and citizen science /low-cost sensors) to evaluate the accuracy and assumptions of pollution models.

The PhD project will use these models to look at specific questions related to real world road use:

- Calculating pollution exposure rates for pedestrians, cyclists and micromobility users
- Characterising pedestrian behaviour – incursion to road, use of crossing, erratic behaviour
- Micromobility behaviour – are eScooter riders adhering to speed limits (advisory or statutory), are they using mobile phones, are helmets in use, is road position legal, are sidewalks in use?
- Automation of traffic control of complex junctions, to ensure safety, optimal throughput
- Prediction of the properties of traffic junction designs before they are actually deployed.
- Do we have to make trade-offs between efficient traffic flow and air quality, or can both be achieved?

**Knowledge and skills required in applicant:**

- Familiarity with Python and ideally a Neural Network framework (pytorch/tensorflow).
- Good analytical/maths skills. Some experience with image/video processing would be advantageous.
- Enthusiasm to learn about spatial data and air quality models, and to collaborate with real-world policy makers and practitioners will be very helpful.

## 2022-2023_042 - Minimum Infrastructure Internet of Things (IoT) Sensor Networks for Air Quality Monitoring

**Supervisor:** Dr Richard Nock (School of Digital Engineering; Electrical and Electronic EngineeringDepartment / Aston Institute of Urban Technology and the Environment - ASTUTE)
**Assoc. Supervisor:** Dr Lucy Bastin (School of Digital Engineering; Computer Science Department /Systems Analytics Research Institute)
**Assoc. Supervisor:** Professor Kate Sugden (School of Digital Engineering; Electrical and ElectronicEngineering Department / Aston Institute of Photonic Technologies - AiPT)

**Area of Research:** Smart city technologies, Internet of Things/wireless sensors for environmentalsensing.

**Project Summary, Aim and Objectives:** Ambient Air Pollution (AAP) is becoming an increasing problem not only for climate change, but for human health as well. The World Health Organisation (WHO) estimates that 90% of people are breathing polluted air and that 7 million people die each year due to particulates entering the lungs and cardiovascular system. AAP is of particular concern in Asia and Africa,but many city centres in the UK also often suffer from particulate concentrations which exceed WHO recommended levels.

Currently, a network of sparse monitoring stations is utilised to monitor values hourly. In Birmingham, there are typically 4 monitoring stations, which provides poor spatial resolution to identify problematic areas. In addition, widespread installation of such stations is limited by cost. This project will investigatethe deployment of wireless sensor nodes containing readily available low-cost sensors to sense the key components of AAP (PM2.5 amongst others). To reduce infrastructure requirements, LoRA mesh technologies will be investigated to reduce communication infrastructure costs, necessitating only a singular gateway in each city. In addition to this, energy harvesting and power reduction techniques will be investigated to ensure nodes can operate for as long as possible.

This work will be undertaken in the ASTUTE research institute and to trial this technique, it is envisaged that a small-scale demonstration system will be installed around the campus at Aston University to monitor AAP air quality values. In addition, wireless sensor nodes will be placed around the inside of the Main Building to monitor indoor air quality.

This system will be used to evaluate the performance of mesh sensor networks in real-life conditions. This approach will bring the highest data rate and spatial resolution possible to air quality monitoring, demonstrating smart city technologies and paving the way towards Aston being a green campus.

**Knowledge and skills required in applicant:**

- Hands-on experience of embedded systems, electronic design (schematic and PCB design) and software engineering are advantageous.
- This project will require strong problem-solving skills and enthusiasm to solve challenging technical problems.
- The candidate should preferably have an electronic engineering degree or a degree in a similarly numerical discipline.

## 2022-2023_032 - The Future of Forests In Sub-Saharan Africa

**Supervisor:** Dr Mirjam Röder (Energy and Bioproducts Research Institute - EBRI)
**Assoc. Supervisor:** Dr Katie Chong (Energy and Bioproducts Research Institute - EBRI)
**Assoc. Supervisor:** Dr Lucy Bastin (Aston Institute of Urban Technology and Environment - ASTUTE)

**Area of Research:** Sustainable forest management, biomass use, bioenergy, carbon modelling,greenhouse gas emission assessment, geographic information systems (GIS), remote sensing.

**Project Summary, Aim and Objectives:** Are you interested in helping developing countries to tackle climate change? This PhD project will investigate the carbon balances and sustainable biomass use from forests in Sub-Saharan Africa (SSA).

The project is of interest to students who want to work in sustainability, climate change mitigation, renewable energy or forests related topics and engage with people. You will use different research methods, analyse historical data, develop future scenarios and work with external organisations, businesses and policymakers. You will be part of a vibrant interdisciplinary team, collaborating with researchers from different career levels and discovering future employment opportunities and careerpathways.

Over 70% of the population in SSA depends on forests for their livelihood. In addition, forests supply about 60% of all energy in SSA, as fuelwood and charcoal, often sourced and used unsustainably.
Deforestation, health risks from air pollution and climate change emissions when burning wood or charcoal are a result. The unsustainable sourcing is reflected by the continuous level of deforestation and forest degradation in SSA.

This PhD will investigate how forest management practices need to change to allow afforestation, improve forest carbon stocks and sustainable wood use. At the same time, this must not compromise theenergy supply of people, communities and industries that supports livelihoods and economic development.

In this PhD project, you will use carbon modelling, land cover/land use assessment, GIS / remote sensing,and lifecycle assessment to evaluate the forest cover and carbon dynamics of different forest types and management practices. In addition, you will investigate the measures required to reduce deforestation and unsustainable forest management, including understanding why deforestation occurs and reviewingbest practice in community forest management. Based on this, you will design sustainable business models for forest management and the transition of unsustainable wood use to sustainable practices supporting livelihoods and economic development.

**Knowledge and skills required in applicant:**

- Understanding of sustainability (environmental, economic, social), renewable energy (preferably bioenergy), climate change, carbon cycle dynamics.
- Good numerical skills. Interest in forests, GIS, and scientific modelling.
- Enthusiasm to work in an interdisciplinary team, work with people outside academia and learn new skills.